## REMARKS

Claims 1-76 are pending. Claims 27-70, 72, and 73 have been withdrawn from consideration. Claims 1, 9, 30, 42, 45, and 66-68 are amended. Claims 74-76 have been added.

Support for the non-narrowing amendments to claim 1 is inherent, or in the specification, for example, on page 1, lines 14-17.

Support for the non-narrowing amendments to claims 9, 30, 42, 45, and 66-68 is inherent.

Support for new claims 74 and 75 can be found in the specification, for example, on page 1, lines 26-32.

Support for new claim 76 is inherent, for example, from the claim from which it depends (i.e., claim 30).

Restriction Requirement

In regard to the Restriction Requirement, it is said in the Office Action that "[a]s to claims 27, 42-44 ... since they encompassed glass ceramics (sic) they are properly restricted".

While a ceramic comprising a glass, may be a glass ceramic, it does not necessarily need to be a glass-ceramic. Additional clarification regarding the proper justification for such restriction is respectfully requested.

**112 Rejections**

Claims 2, 3, and 9 stand rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

It is alleged in the Office Action that "REO" is not defined in claims 2 and 3.

The term "REO" as used in the specification and claims is clearly defined on page 5, lines 17-23.

It is alleged that in claim 9, the terminology "comprising" is contradictory to the glass being 100% of the recited components. It is said that it cannot be seen how any other components may be present.

Claim 9 has been amended to overcome this rejection.

In summary, Applicant submits that the rejection of claims 2, 3, and 9 under 35 USC § 112, second paragraph should be withdrawn.

**Double Patenting**

Claims 1-26 and 71 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-23 and 69 of copending Application No. 10/666,212. It is said that although the conflicting claims are not identical, they are not patentably distinct from each other because the scope of the copending applications overlap.

This is a provisional obviousness-type double patenting rejection because they conflicting claims have not in fact been patented.

Upon an indication of otherwise allowable subject matter and in the event this rejection is maintained, Applicants will provide an appropriate response.

**102 Rejections**

Claims 1-14, 18-21, 23-26, and 71 stand rejected under 35 USC § 102(b) as being anticipated by U.S. Pat. 3,754,978 (Elmer et al.).

The rejection of claims 1-14, 18-21, 23-26, and 71 under 35 USC § 102(b) as being anticipated by '978 (Elmer et al.) should be withdrawn.

Specifically, the Office Action alleges Examples 9 and 10 includes an amorphous composition of 70 wt% $Al_2O_3$, 21% $ZrO_2$, and an amorphous composition of 9% $Ta_2O_5$; and an amorphous composition of 60 wt% $Al_2O_3$, 20% $ZrO_2$, and 20% $Ta_2O_5$, and hence the claims are considered anticipated.

'978 (Elmer et al.) reports a devitrification-resistant glaze for high-silica glasses, particularly effective in inhibiting surface devitrification induced by contact with food-ash at elevated temperatures, formed from a coating consisting essentially, in weight percent, of about 25-85 percent $Al_2O_3$ and 15-75 percent $ZrO_2$, and optionally containing up to about 10 percent $Ta_2O_5$. The coating is preferably applied in the form of an aqueous slurry which is dried and fired to produce a vitreous glaze.

Independent claim 1 requires a glass collectively comprising at least 70 percent by weight of (i) at least one of $Nb_2O_5$ or $Ta_2O$ and (ii) at least two of (a) $Al_2O_3$, (b) $Y_2O_3$, or (c) at least one of $ZrO_2$ or $HfO_2$, and containing not more than 30 percent by weight collectively $As_2O_3$, $B_2O_3$, $GeO_2$, $P_2O_5$, $SiO_2$, $TeO_2$, and $V_2O_5$, based on the total weight of the glass.

The glaze" referred to in '978 (Elmer et al.) formed from a coating having a composition about 25-85 by weight $Al_2O_3$, 15-75 percent by weight $ZrO_2$, and optionally up to 10 percent by weight $Ta_2O_5$ contains significantly more than 30 percent by weight $SiO_2$, and hence does not anticipate independent claim 1. That is, claim 1 can contain no more than 30 percent by weight $SiO_2$.

The '978 (Elmer et al.) glaze that contains the $Al_2O_3$, $ZrO_2$, and optionally $Ta_2O_5$ is made by reacting the $Al_2O_3$, $ZrO_2$, and optional $Ta_2O_5$ with high silica glass (see, e.g., col. 2, lines 5-10, 17-22, and 29-32; col. 3, lines 1-3; and col. 4, lines 4-6 and 10-17). The examples of "high silica" glasses listed in '978 (Elmer et al.) are fused silica (understood to be 100% silica) and a glass that is 96 percent by weight $SiO_2$ (see, e.g., col. 3, lines 1-3 and col. 4, lines 18-22). It is submitted that one of ordinary skill in the art understands that when the $Al_2O_3$, $ZrO_2$, and

optional $Ta_2O_5$ react with the $SiO_2$ (silica), the resulting material (i.e., the glaze) will contain $SiO_2$. Further, it is submitted that the amount of $SiO_2$, will be significantly more than 30 percent by weight. It is submitted that the reactions will be the lowest melting point for the materials on the applicable phase diagram. For example, for $SiO_2$, $Al_2O_3$, and $ZrO_2$, the lowest melting point contains significantly more than 30 percent by weight $SiO_2$ (see enclosed $SiO_2$-$Al_2O_3$-$ZrO_2$ phase diagram (Fig. 771)). For example, for $SiO_2$ and $Ta_2O_5$, the lowest melting point contains significantly more than 30 percent by weight $SiO_2$ (see enclosed $SiO_2$-$Ta_2O_5$ phase diagram (Fig. 4447)).

Claims 2-14, 18-21, 23-26, and 71 (and new claims 74 and 75) depend directly or indirectly from claim 1. Claim 1 is patentable, for example, for the reasons given above. Therefore, claims 14, 18-21, 23-26, and 71 (and new claims 74 and 75) should also be patentable.

In summary, the rejection of claims 1-14, 18-21, 23-26, and 71 under 35 USC § 102(b) as being anticipated by '978 (Elmer et al.) should be withdrawn.

**Information Disclosure Statements**

It is alleged in the Office Action:

> The information disclosure statements filed 9/30/05, 7/6/05, 4/5/05, 3/8/05, 2/18/05, 1/20/05, 12/8/04, 10/28/04, 8/16/04, 8/12/04, 6/15/04 fail to comply with the provisions of 37 CFR 1.97, 1.98, and MPEP § 609 because it does not disclose the relevance of the art to the elected invention. Due to the large volume of references, applicant is required to point to any reference and relevant portion to the elected invention, See MPEP 609 (a) 3. It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

It is submitted that the instant Office Action fails to provide proper basis for the alleged requirement that Applicants point to any reference or portion of reference having particular relevance to the elected invention in this application. The last paragraph of MPEP 609 A(3) states:

> Although a concise explanation of the relevance of the information is not required for English language information, applicants are encouraged to provide a concise explanation of why the English-language information is being submitted and how it is understood to be relevant. Concise explanations (especially those which point out the relevant pages and lines) are helpful to the Office, particularly where documents are lengthy and complex and applicant is aware of a section that is highly relevant to patentability or where a large number of documents are submitted and applicant is aware that one or more are highly relevant to patentability.

Clearly there is no requirement that Applicants point to any reference or portion of reference having particular relevance to the elected invention in this application. Hence, Applicants again

respectfully request the Examiner initial, sign, and return to the undersigned the PTO-1449 forms included with the Information Disclosure Statements bearing Certificate of Mailing or Transmission dates of June 9, 2004; June 10, 2004; August 10, 2004; August 11, 2004; October 26, 2004; December 8, 2004; January 20, 2005; February 18, 2005; March 8, 2005; April 5, 2005; July 6, 2005; and September 30, 2005.

In view of the above, it is submitted that the application is in condition for allowance. Reconsideration of the application is requested.

Allowance of the pending claims, as amended, at an early date is solicited.

Respectfully submitted,

February 9, 2006
Date

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# Phase Diagrams for Ceramists

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Compiled at the National Bureau of Standards

Margie K. Reser, *Editor*

**FIFTH PRINTING 1985**


The American Ceramic Society
65 Ceramic Drive, Columbus, Ohio 43214

Printed in U.S.A.

ISBN 0-916094-04-9

## $Al_2O_3$–$SiO_2$–$TiO_2$ (concl.)

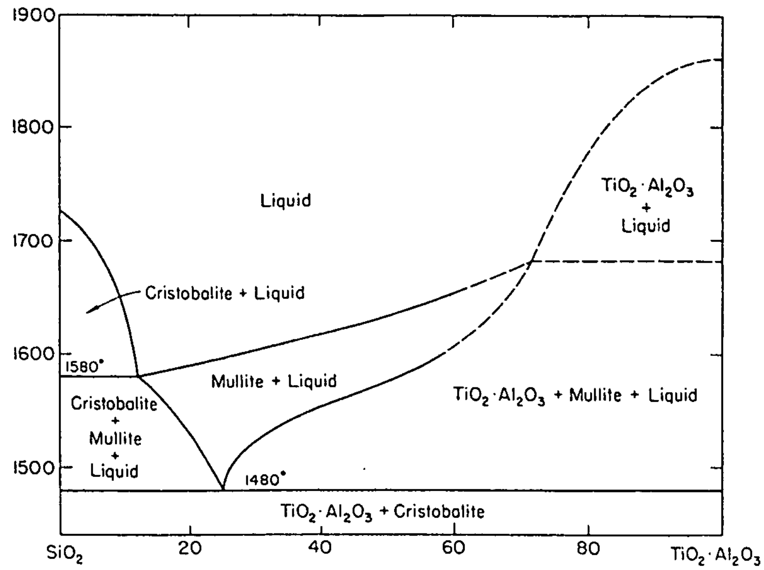


FIG. 771.—System $SiO_2$–$Al_2O_3 \cdot TiO_2$.

Y. M. Agamawi and J. White, *Trans. Brit. Ceram. Soc.*, **51**, 310 (1951–52).

## $Al_2O_3$–$SiO_2$–$ZrO_2$

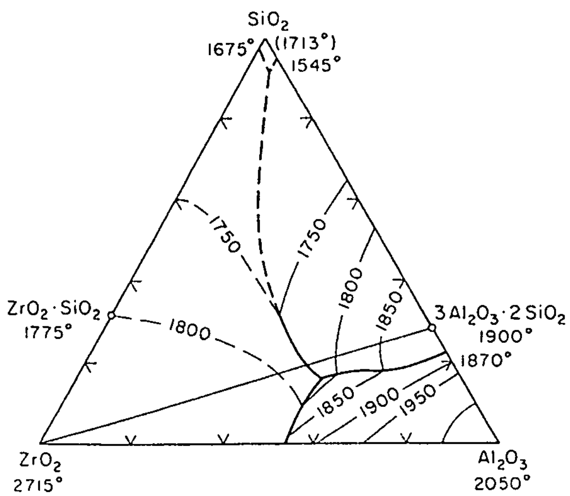


FIG. 772.—System $Al_2O_3$–$SiO_2$–$ZrO_2$.

P. P. Budnikov and A. A. Litvakovskiĭ, *Doklady Akad. Nauk S.S.S.R.*, **106**, 268 (1956).

## $Al_2O_3$–$TiO_2$–$ZrO_2$

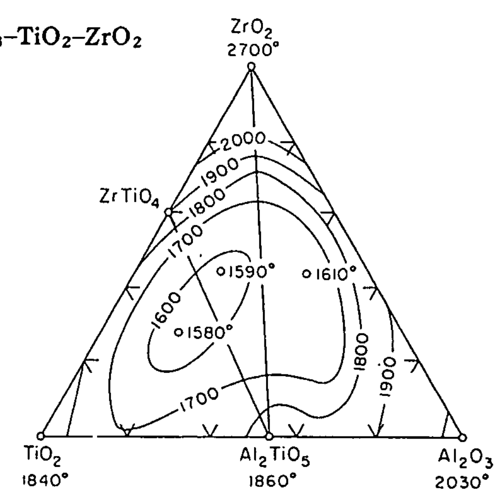


FIG. 773.—System $Al_2O_3$–$TiO_2$–$ZrO_2$; melting isotherms.

A. S. Berezhnoĭ and N. V. Gul'ko, *Dopovidi Akad. Nauk Ukr. R.S.R.*, 1955 [1] 78.

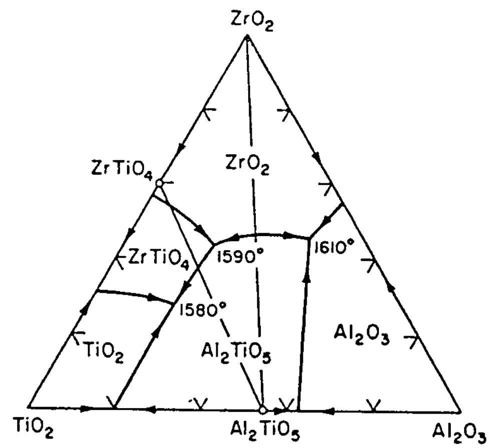


FIG. 774.—System $Al_2O_3$–$TiO_2$–$ZrO_2$; primary phases.

A. S. Berezhnoĭ and N. V. Gul'ko, *Dopovidi Akad. Nauk Ukr. R.S.R.*, 1955 [1] 78.

## $B_2O_3$–$SiO_2$–$P_2O_5$

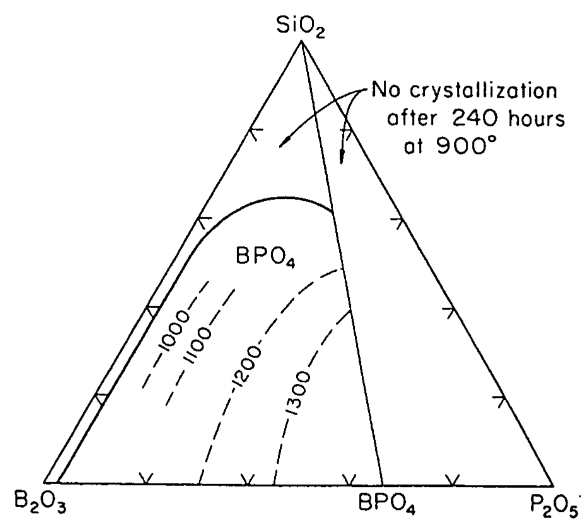


FIG. 775.—System $B_2O_3$–$SiO_2$–$P_2O_5$. Not true ternary at atmospheric pressure and temperature below 1400°C. because of retained water.

W. J. Englert and F. A. Hummel, *J. Soc. Glass Technol.*, **39**, 126T (1955).

# Phase Diagrams for Ceramists

# 1975 Supplement


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Margie K. Reser, *Editor*



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## $NbO_2$–$TiO_2$

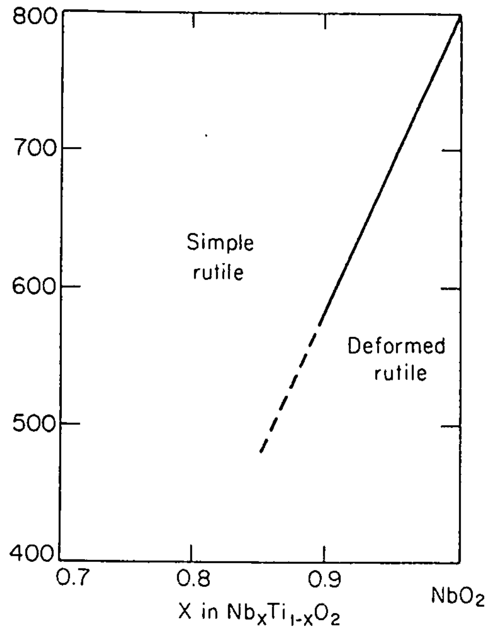


FIG. 4446.—System $Nb_xTi_{1-x}O_2$, showing phase transition temperature.
K. Sakata, *J. Phys. Soc. Jap.*, **26** [4] 1067 (1969).

Five mixtures of $NbO_2$ and $TiO_2$ powders (purity unspecified) were prepared by sealing them under vacuum in a fused-$SiO_2$ tube and heating them for 1 day at 650° and 2 days at 950°. Phase analysis was conducted by means of X-ray diffraction and DTA.

The entire system constitutes a continuous solid-solution series in which the normal rutile phase was identified for $0 < x < 0.85$ and the deformed rutile for $0.85 < x$ at room temperature. In the plot of lattice parameters as a function of composition, $c$ shows a maximum, reflecting a competition between expansion caused by substitution of $Nb^{4+}$ for $Ti^{4+}$ and contraction resulting from the formation of Nb–Nb pair bonds in the lattice. For $x = 0.85$, the X-ray diffraction patterns show superstructure reflections which characterize the deformed rutile-type structure, whereas by DTA no thermal effects were observed.

## $SiO_2$–$Ta_2O_5$

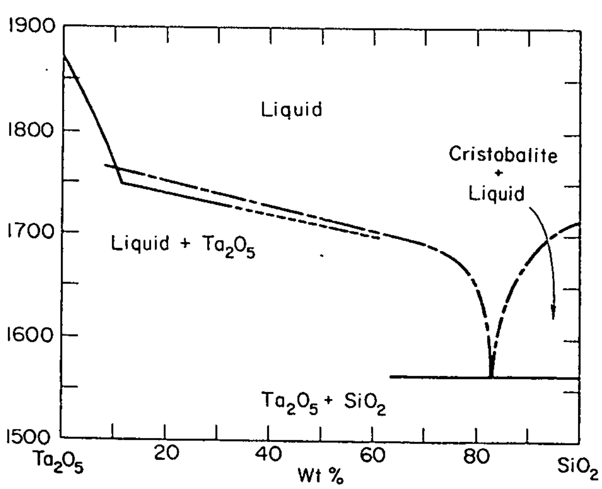


FIG. 4447.—System $Ta_2O_5$–$SiO_2$. Dash-dot curve is after E. A. Bush, Progress Reports Nos. 1 and 2, Department of Ceramic Technology, Pennsylvania State University, University Park, PA, 1964.
D. A. Reeve and N. F. H. Bright, *J. Amer. Ceram. Soc.*, **52** [8] 407 (1969).

The liquidus curve near the $Ta_2O_5$ component was determined from data for 8 compositions using a Griffin-Telin hot-stage microscope modified for 2 kinds of noble-metal thermocouples, as described in the commentary to Fig. 4316. Starting materials consisted of silicic acid (Analyzed Reagent, J. T. Baker Chemical Co.) and $Ta_2O_5$ (Fansteel Inc., C-200) with a stated purity of 99.9%. Mixtures were homogenized by pelletization followed by sintering at 1500° for 48 h, with intermediate grinding.

The liquidus curve of Bush (determined by strip-furnace measurements) extrapolated to 100% $Ta_2O_5$ gives 1785°, which is the reported mp of the low-temperature form.[1] According to Ref. 2 (Fig. 4448), the addition of $SiO_2$ (as well as $WO_3$, $GeO_2$, $B_2O_3$, and $Al_2O_3$) to $Ta_2O_5$ forms phases structurally similar to low $Ta_2O_5$, which are stable up to solidus temperatures. An alternate explanation for the increased stability of low $Ta_2O_5$ is solid solution of the added oxides. The sharp discontinuity in the liquidus at $\approx$1750° is consistent with either hypothesis.

1. A. Reisman, R. Holtzberg, M. Berkenblit, and M. Berry, *J. Amer. Chem. Soc.*, **78** [18] 4514 (1956).
2. R. S. Roth and J. L. Waring, *J. Res. Nat. Bur. Stand., Sect. A*, **74** [4] 485 (1970).

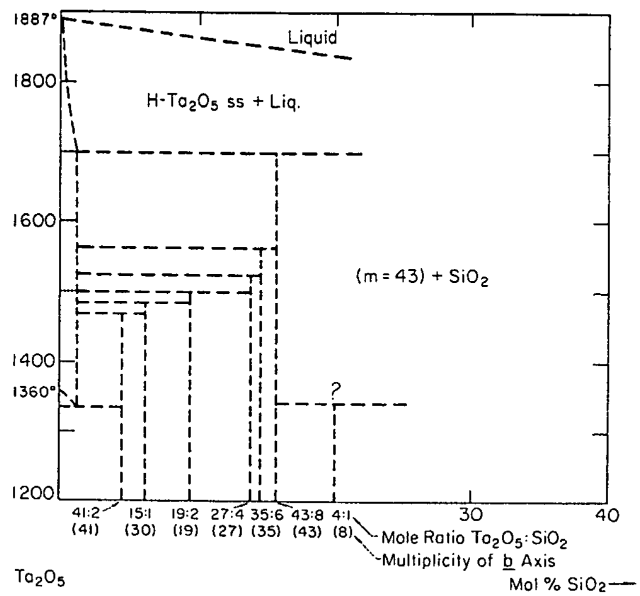


FIG. 4448.—System $Ta_2O_5$–$SiO_2$, showing $Ta_2O_5$–rich region.
R. S. Roth and J. L. Waring, *J. Res. Nat. Bur. Stand., Sect. A*, **74** [4] 487 (1970).

Except for the following modifications, the materials, methods, and interpretation are similar to those for the companion $Al_2O_3$–$Ta_2O_5$ system (Fig. 4380). Four compositions containing 5, 10, 25, and 50% $SiO_2$ (reagent grade) were prepared with the $Ta_2O_5$ by the solid-state method. Final heat treatments were done in sealed Pt tubes at temperatures between 1325° and 1595° for 4.5 to 65 h, before quenching and examination by X-ray diffraction powder techniques. Although not shown on the diagram, it should be noted that the data may also be interpreted on the basis of a conventional solid-solution phase diagram. Figure 4447 shows the liquidus for the entire system.